

Hyptis iodantha sp. nov. per specim. in Mexico prov. Guerrero in regione Mina prope Zapo in colle a Hinton (no. 9844) lectum constituta est; typum in herb. Univ. Calif. (Los Angeles), isotypum in herb. Kew. vidi.

Frutex pulcher altitudine ad 3 m. ramulis villosis et inter flores hirtellis; foliorum laminis ovato-lanceolatis 12–15 cm. longis 5–7 cm. latis supra medium longe acuminatis in basi cordatis, petiolis 1–2 cm. longis elatis, marginibus irregulariter crenato-serratis pagina superiore hirtella inferiore incano-tomentosa molle; floribus numerosis in umbellis purpureis pedunculis 1–2 mm. longis elatis bracteis minutis subtentis in paniculis divaricato-ramosis 20–25 cm. altis dispositis pedicellis maturis filiformibus 5 mm. longis superne incrassatis elatis; calycibus florentibus turbinatis 2.5 mm. longis extus dense purpureo-pubescentibus, dentibus deltoideis vix .5 mm. altis in maturitate conniventibus in maturitate tubo 4.5 mm. longo subcylindrato; corollarum violacearum tubo 2.5 mm. longo.

MEXICO: Guerrero; Mina; Zapo in colle.

University of California at
Los Angeles, April 20, 1938.

THE VIOLETS OF COLORADO

ALICE MARIAL SPOTTS

The genus *Viola* is a characteristic although a minor element of the flora of Colorado. *Viola Nuttallii*, a yellow-flowered perennial with lanceolate leaves, and *V. Rafinesquii*, a small blue-flowered annual, both of which flower in April and May, are frequent on the eastern plains and the lower foothills. In shady canyons, at lower altitudes, the long-stemmed white-flowered *V. rugulosa* and *V. canadensis* are important. Montane species are nowhere common.

Since the "New Manual of Rocky Mountain Botany" (1909) by Coulter and Nelson is now thirty years old, and "The Flora of Colorado" (1906) and "Flora of the Rocky Mountains and Adjacent Plains" (1917) by Rydberg are both out of print it seems desirable to prepare a re-description of the species of violets of Colorado. The descriptions have been drawn from herbarium specimens and from the writer's field observations during two seasons. The University of Colorado specimens of early collection, which were identified by Ezra Brainerd, formed a valuable beginning for the present study.

In the "Flora of Colorado," Rydberg lists fourteen species and three varieties of violets for the state. Brainerd in Rydberg's "Flora of the Rocky Mountains and Adjacent Plains" credits Colorado with twenty-one species and one variety. In Brainerd's later work, "Violets of North America" (Bull. Ver-

mont Agri. Exp. Sta. no. 224. 1921) fourteen species are listed for Colorado. The present paper describes eighteen species and mentions three subspecies and one variety. The nomenclature here followed is that of Brainerd's treatment in the "Flora of the Rocky Mountains and Adjacent Plains" with the following exceptions: *Viola montanensis* Rydb. is not considered distinct from *V. adunca* J. E. Smith (thus agreeing with Brainerd's later treatment); *V. scopulorum* (Gray) Greene is not considered a distinct species but a variety of *V. canadensis* L.

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In the field, the different species of violets may be recognized chiefly by flower color and habit of growth, but in dried specimens the color is often faded and growth habit is not always easy of determination. The key given in this study utilizes as a primary segregating character the presence or absence of evident stems above ground and as a secondary division leaf outline and flower color. The presence or absence of stolons is difficult to use in a key since many specimens are collected before the stolons have developed. Violet plants may be glabrous, subglabrous or pubescent, yet pubescence is such a variable character that it is not advisable to rely too much upon it in the segregation of species. The length and outline of the spur is often useful in the identification of a species. The shapes of style and stigma vary in different species but are often distorted by drying. Cleistogamy is frequent among violets, the late summer or early autumn cleistogamous flowers bearing an abundance of seeds. The characters of the cleistogamous flowers may be of taxonomic value but cannot always be made use of since herbarium specimens are often collected at a time when the plants are producing only petaliferous flowers. Fruit and seed characters are often valuable and are used in the specific descriptions in this paper.

Most of the violets occurring in Colorado are widely distributed, about half of the species ranging chiefly to the east and the other half chiefly to the west as far as the Pacific Coast states. One variety and three subspecies are confined to the Rocky Mountain region: *Viola canadensis* var. *scopulorum* Gray, *V. adunca*

- Leaves hirtellous on upper surface; spur long, enlarged and rounded at base 3. *V. Selkirkii*
- Leaves glabrous throughout; spur short and thick, plants stoloniferous 4. *V. palustris*
- Rootstocks thick; length of petals usually more than 10 mm.
- Spurred petal glabrous, rounded at apex; leaves subacute or abruptly pointed 5. *V. pratincola*
- Spurred petal bearded, emarginate or retuse; leaves obtuse to acuminate.
- Mature leaves obtuse; spurred petal thickly bearded; sepals obtuse 6. *V. nephrophylla*
- Mature leaves often abruptly acuminate; spurred petal slightly hairy; sepals acute 7. *V. retusa*
- Plants caulescent; flowers axillary; petals pale bluish-violet, violet, white, or yellow.
- Annuals; stipules large, leaf-like, palmately pinnatifid or lacinate; petals pale bluish-violet 8. *V. Rafinesquii*
- Perennials; stipules small, entire or spinulose-serrate. Leaves divided; flowers pale yellow 9. *V. Sheltonii*
- Leaves entire, denticulate, or shallowly lobed.
- Flowers yellow, often tinged on the back with purple or brown.
- First peduncles from axils of upper leaves; leaves cordate-reniform 10. *V. biflora*
- First peduncles arising from near base of plant; leaves various.
- Plant erect; basal leaves 4-9 cm. long, oblong-lanceolate to ovate 11. *V. linguaeifolia*
- Plant ascending or widely spreading to prostrate; basal leaves 2-7 cm. long, of various shapes.
- Plant usually dwarf; peduncles seldom 8 cm.; upper leaf-blades less than 2 cm., 3-lobed, hastate 12. *V. venosa*
- Plant larger; all leaves entire, denticulate, or dentate, never hastate.
- Leaves linear-lanceolate, subacute, the base tapering into the petiole 13. *V. Nuttallii*
- Leaves truncate to subcordate, obtuse 14. *V. vallicola*
- Flowers violet, or nearly white with purple veins.
- Flowers violet; stipules spinulose, serrate, or toothed.
- Plant dwarf, glabrous; stem short and obscure 15. *V. bellidifolia*
- Plant generally more than 5 cm. tall, puberulent throughout or glabrous; stems numerous 16. *V. adunca*
- Flowers white, purple veined, with yellow base, purple on back; stipules entire, mostly scarious.
- Leaves hirsutulous beneath, the root leaves from broadly cordate to reniform; plants stoloniferous 17. *V. rugulosa*
- Leaves subglabrous, the root leaves cordate ovate; stolons not present 18. *V. canadensis*

1. *VIOLA PEDATIFIDA* Don, Gard. Dict. 1: 320. 1831. *V. delphinifolia* Nutt. in Torr. & Gray, Fl. N. Amer. 1: 136. 1838. Prairie Violet.

Rootstock ascending; plant without stolons, acaulescent, 7–20 cm. high, minutely pubescent or almost glabrous; leaf blades 1–7 cm. long, 2–8 cm. wide, 2–3 parted, divisions ternately cleft and incised into linear, obtuse, entire or lobed segments, usually truncate or cuneate at the base, margins and mid-rib hirsutulous; petioles 3–13 cm. long; stipules ovate-lanceolate, acuminate; petals violet, obovate, 10–20 mm. long, half as wide, lateral petals bearded; spur short; sepals linear or lanceolate, acute or obtuse, 6–10 mm. long, 1–3 mm. wide, margins hirsutulous; peduncles of petaliferous flowers taller than the leaves, of apetaliferous flowers shorter, but erect; cleistogamous capsule light gray when ripe, glabrous, 10–15 mm. long; seeds light brown, 2 mm. long.

From Ohio northwest through Wisconsin and Minnesota to Alberta, southwest through the prairie and Rocky Mountain states to New Mexico and Arizona. Colorado: moist grassland forest openings, 5,000 to 10,000 feet; infrequent. April–June.

2. *VIOLA RENIFOLIA* Gray, Proc. Amer. Acad. 8: 288. 1870. *V. Brainerdii* Greene, Pittonia 5: 89. 1902. Kidney-leaved Violet.

Rootstock ascending, commonly slender but becoming thick in old plants; acaulescent, 5–10 cm. tall, pubescent to subglabrous; stolons absent; leaf-blades rather thin, reniform-cordate, 3–6 cm. long and about as wide, the later leaves sometimes blunt-pointed, margins distinctly crenate-serrate; petioles longer than the blades, often twice as long; stipules linear; petals white, the lower frequently with purplish veins, obovate-spatulate, 6–10 mm. long, either beardless or the laterals with small tufts of hairs; spur short; sepals lanceolate, pale margined, half as long as the petals; peduncles from shorter than to slightly longer than the petioles; capsules ellipsoidal, purplish, 10–15 mm. long; seeds about 1.5 mm. long.

Newfoundland to Pennsylvania and west through Michigan and Minnesota to Saskatchewan and northward, also in the Black Hills of South Dakota and in the Rocky Mountains to Colorado. Colorado: wet ground in Engelmann spruce forests, 9,000 to 11,000 feet; rare. May–July.

3. *VIOLA SELKIRKII* Pursh (ex Goldie) in Edinb. Phil. Journ. 6: 324. 1822. Great Spurred Violet.

Rootstock slender, creeping or horizontal; plant without stolons, acaulescent, 4–10 cm. high, nearly glabrous; leaf-blades thin, broadly cordate-ovate, short acute or obtuse, 1–4 cm. long, as broad or nearly as broad as long, crenate, upper surface hirtellous; petioles 1.5–7.0 cm. long; stipules ovate, often toothed at apex; petals pale violet, broadly spatulate or obovate, 5–10 mm. long, half as wide, beardless; spur nearly as long as petals, the end enlarged and round; sepals lanceolate or ovate-lanceolate, acute or somewhat acuminate, 4–6 mm. long, 2–3 mm. wide;

peduncle 3-7 cm. long; peduncles of cleistogamous flowers erect or ascending; capsule subglobose, 4-8 mm. long; seeds 1.5 mm. long, pale buff.

New Brunswick, Nova Scotia, and northward; south through New England to Massachusetts and Pennsylvania; west through Ontario and Minnesota to the mountains of British Columbia and south in the Rocky Mountains to New Mexico. Colorado: moist woods and shady ravines from 7,000 to 10,000 feet; rare. April-June.

4. *VIOLA PALUSTRIS* L., Sp. Pl. 934. 1753. Marsh Violet.

Rootstock slender, scaly, creeping or horizontal; plant stoloniferous, acaulescent, 5-15 cm. tall, glabrous throughout; scapes generally surpassing the leaves, bracteolate at the middle or below; leaf-blades thin, ovate-cordate to orbicular or reniform, 2-4 cm. long, generally wider than long, the margin crenulate; petioles often twice as long as blades; stipules lanceolate, sometimes with a few subulate teeth at apex; petals pale lilac to nearly white with darker veins, obovate or broadly spatulate, 6-10 mm. long, the lateral petals bearded; spur short, thick and rounded; sepals ovate to ovate lanceolate, narrowly white-margined, 5-6 mm. long, obtuse; seeds dark brown, 1.5 mm. long.

Labrador south through the mountains of New England, west to Alaska, British Columbia, Washington, Oregon, and northern California, also in South Dakota and the Rocky Mountains to Colorado; Asia and Europe. Colorado: wet or moist soil in shady situations from 7,000 to 10,000 feet; infrequent. May-August.

4a. *VIOLA PALUSTRIS* subsp. *BREVIPES* M. S. Baker, Madroño 3: 235. 1936.

This subspecies differs from the species in its smaller size and the pure white fragrant flowers with lateral petals entirely beardless. Estes Park and Moraine Park, Colorado.

5. *VIOLA PRATINCOLA* Greene, Pittonia 4: 64. 1899. *V. Sandbergii* Greene, Pittonia 5: 119. 1903. Meadow or Hooded Blue Violet.

Rootstock ascending; plant without stolons, acaulescent, 7-30 cm. high, usually glabrous; leaf-blades deeply cordate-ovate tapering gradually to subacute apex or sometimes abruptly pointed, 2-3 cm. wide at petaliferous flowering, 5-8 cm. wide at maturity, as long as wide, crenulate; petioles 2 or 3 times as long as the blade; stipules linear-lanceolate; petals violet, light at base, spatulate, 10-15 mm. long, 4-6 mm. wide, lateral petals somewhat bearded; spurred petal glabrous, rounded at apex; spurs short; sepals ovate-lanceolate, acute or obtuse; peduncles as long as or much longer than the leaves, bracteolate at or above the middle; cleistogamous flowers on short prostrate peduncles; capsules ellipsoidal, 6-10 mm. long; seeds 1.5-2.0 mm. long.

Minnesota and North Dakota to Wyoming and Colorado. Colorado: prairies and hills; open situations, 4,000 to 8,000 feet; infrequent. April–May.

6. *VIOLA NEPHROPHYLLA* Greene, *Pittonia* 3: 144. 1896. *V. cognata* Greene, *Pittonia* 3: 145. 1896.

Rootstock generally ascending, moderately thick; plant without stolons, acaulescent 5–15 cm. tall, nearly or quite glabrous; leaf-blades firm, broadly cordate-ovate to reniform, obtuse, 1–3 cm. long, 1–4 cm. broad, crenate-serrate, late-season leaves larger; petioles slender, two or three times the length of the blades; stipules ovate-lanceolate; petals violet, lighter at base with purple veining, obovate, large, 10–15 mm. long, half as wide, pubescent to villous, the spurred petal villous, emarginate; spur rounded, about one-fourth the length of petals; sepals ovate to oblong, often rounded, 4–8 mm. long, 2–3 mm. wide; peduncles slender, 4–12 cm. long; cleistogamous flowers ovoid on slender short peduncles; capsules short-ellipsoidal, green, glabrous, 8–10 mm. long; seeds 2.0–2.5 mm. long, olive-brown.

South Dakota and west to British Columbia; south in mountain areas to New Mexico, Arizona, Utah, Nevada, and California. Colorado: low meadows, moist aspen groves, and sloping ground among bushes, 5,000 to 10,000 feet; moderately frequent. May–July.

This is the *V. nephrophylla* of Brainerd's account in Rydberg's "Flora of the Rocky Mountains and Adjacent Plains" (1917). I have seen no specimens which I could refer to *V. nephrophylla* as originally described by Greene from western Colorado. Plants of this species are conspicuous because of their firm leaf-blades, long slender petioles and peduncles, and large flowers.

7. *VIOLA RETUSA* Greene, *Pittonia* 4: 6. 1899. Western Blue Violet.

Rootstock ascending, stout; plant without stolons, acaulescent, 4–15 cm. high, glabrous throughout; leaf-blades at spring flowering broadly ovate or cordate-deltoid, acute or obtuse, 2–4 cm. long, 2–6 cm. wide, finely serrate; aestival leaves wider, reniform, often abruptly acuminate, the base cordate to truncate-decurrent, crenate-serrate; petioles 1–3 times as long as blades; stipules ovate, acuminate, sometimes toothed at apex; petals violet, the upper obovate, 10–15 mm. long, 5–6 mm. wide, lateral petals spatulate, somewhat bearded, spurred petal slightly hairy, retuse; spurs short and rounded; sepals lanceolate, white-margined, acute, 5–6 mm. long, 1–2 mm. wide; peduncle somewhat exceeding the leaves; cleistogamous flowers ovoid, on erect peduncles; capsules ellipsoidal, green, 10–12 mm. long; seeds brown, 2 mm. long.

Central Kansas, northwest and west to the mountain front and

foothill districts of Colorado. Colorado: shady thickets and along streams from 4,000 to about 7,000 feet; moderately frequent. May-June.

8. *VIOLA RAFINESQUII* Greene, Pittonia 4: 9. 1899. *V. bicolor* Pursh, Fl. Am. Sept. 1: 175. 1814, not *V. bicolor* Gilib. 1781. *V. tenella* Raf. in Medical Repository, N. Y. ser. 2, 5: 354. 1808 (*nomen*); Am. Monthly Mag. 191. 1819, not *V. tenella* Poir. 1810. Wild Pansy.

Annual, rootstock ascending, plant caulescent, 1-2 dm. high, lower part of stem somewhat pubescent with recurved hairs, becoming nearly glabrous with age; stems slender, often branching from base; lower leaf-blades suborbicular, 3-10 mm. long, upper oblong-lanceolate to ovate, 10-20 mm. long, 3-5 mm. wide, entire or crenate-dentate, attenuate at the base, margins minutely pubescent; petioles of lower leaves about twice as long as blades, of upper leaves one-third as long as blades; stipules foliaceous, 5-14 mm. long, palmately pinnatifid or laciniate, terminal segment elongate; petals cream-colored, blue or purplish spotted, obovate, 4-9 mm. long, 2-4 mm. wide; spur very short; sepals subulate, about half as long as petals, margins hirsutulous; peduncle 1.5-3.0 cm. long; capsule glabrous, 6 mm. long or less; seeds light brown, 1.5 mm. long.

New York to Michigan, south to Georgia, west through the Mississippi basin to Colorado and Texas. Colorado: moist sloping ground of plains and lower foothills, 4,000 to 7,000 feet; locally frequent. April-May.

9. *VIOLA SHELTONII* Torr., Pacif. Rail. Rep. 4: 67, t. 2. 1857. *V. biternata* Greene, Pl. Baker. 3: 12. 1901. Fan Violet.

Rootstock ascending, deep-seated; plant subcaulescent to caulescent, 5-15 cm. or taller, hirsutulous or nearly glabrous; leaf-blades 1-4 cm. long, and fully as wide, palmately 3-divided, the divisions palmately or pedately 3-parted and cleft; petioles 3-10 cm. long or longer; stipules lanceolate to ovate, scarious; petals yellow, strongly veined, tinged with brown beneath, obovate, 6-12 mm. long, half as wide as long, lateral petals slightly bearded; spur hardly one-third the length of the petals; sepals linear-lanceolate, acuminate, 4-8 mm. long; peduncles 5-15 cm. long; capsule globose, 6-8 mm. long, brown, glabrous; seeds buff, 2 mm. long.

Western Colorado to Washington, Oregon, and California. Colorado: rocky hillsides of the western slope of the Rocky Mountains from 7,000 to 9,000 feet; infrequent to rare. April-June.

10. *VIOLA BIFLORA* L., Sp. Pl. 936. 1753. Alpine Yellow Violet.

Rootstock ascending; plant caulescent, 5-20 cm. high; stems

slender, generally 2-leaved and 2-flowered; leaf-blades round-reniform, narrowly cordate at base, rounded at apex, 1–2 cm. long, twice as wide as long, somewhat hirtellous on upper surface and margins, crenulate; stipules ovate; petioles 3–8 cm. long; petals yellow streaked with dark purple-brown, spatulate, 6–8 mm. long; half as wide as long; spur short-conical; sepals linear-oblong, 4 mm. long; peduncles surpassing the leaves; capsule about 6 mm. long, ellipsoidal; seeds about 1 mm. long.

Northern Europe and Asia to Alaska; Colorado. Colorado: wet moss and dense herbaceous vegetation in fine alluvial soil along mountain streams from 8,000 to 11,000 feet; rare. April–July.

11. *VIOLA LINGUAEFOLIA* Nutt., in Torr. & Gray Fl. N. Am. 1: 141. 1838. *V. flavovirens* Pollard, Bull. Torr. Bot. Club 24: 405. 1897. *V. erectifolia* Nels., Bot. Gaz. 29: 143. 1900. *V. gomphopetala* Greene, Pl. Baker. 3: 11. 1901.

Rootstock ascending, slender; plant caulescent or subcaulescent, erect, 1–3 dm. high, hirtellous to nearly glabrous; leaf-blades narrowly oblong to ovate-lanceolate, mostly obtuse, 5–9 cm. long, 1.5–3.0 cm. wide, entire or repand-denticulate, margins ciliate, veins generally hirtellous; petioles about twice the length of leaf-blades; stipules lanceolate, acuminate; petals yellow, veined with purple, often appearing reddish-brown in dried specimens, 10–15 mm. long, 5–8 mm. wide, upper petals obovate, lateral petals spatulate, usually somewhat bearded; spur very short; sepals linear-lanceolate, acuminate, 5–8 mm. long, margins usually ciliate; peduncle generally as long as or surpassing the leaves; late flowers cleistogamous from upper axils; capsule globose, usually glabrous; seeds 2–3 mm. long.

Montana to Colorado, west to Washington and northern California. Colorado: mountain valleys or coarse soil near lakes, 8,000 to 10,000 feet; infrequent. June–August.

12. *VIOLA VENOSA* (S. Wats.) Rydb., Mem. N. Y. Bot. Gard. 1: 262. 1900. *V. Nuttallii* var. *venosa* Wats., Bot. King Exped. 35. 1871. *V. atriplicifolia* Greene, Pittonia 3: 38. 1896. *V. Thorii* Nels., Bot. Gaz. 30: 193. 1900. Dwarf Yellow Violet.

Rootstock vertical or nearly so; plant caulescent, 5–15 cm. tall, glabrate to pubescent; stems many, ascending, short; lower leaf-blades ovate, obtuse, 1–2 (seldom 3) cm. long and two-thirds as wide, coarsely round-toothed or lobed and tapering into a long margined petiole, the upper leaves often three-lobed hastate; stipules lanceolate, entire; petals yellow tinged with purple dorsally (often quite purple in drying), obovate, 6–10 mm. long and half as wide, usually beardless; spur short; sepals hirtellous to pubescent, lanceolate, white margined, one-third to one-half the length of the petals; peduncles 2–5 cm. long, bracteolate half-way up; capsule nearly globose, 4–5 mm. long; seeds about 1 mm. long.

Montana and Wyoming, west through Idaho and Utah to Washington, Oregon and California. Colorado: northwestern part of the state on dry hillsides and in openings of dry coniferous forest, 6,000–8,000 feet. April–May.

13. *VIOLA NUTTALLII* Pursh, Fl. Am. Sept. 1: 174. 1814. Nuttall Violet.

Rootstock ascending, semi-fleshy, occasionally branched or somewhat fascicled; plant caulescent, 5–25 cm. high, pubescent or glabrate to nearly glabrous; stems numerous, spreading rather than erect, generally short unless in a moist situation; leaf-blades oblong-lanceolate or linear-lanceolate, acute or subacute, 2–7 cm. long, 6–20 mm. wide, some puberulent, entire or repand-denticulate, tapering into margined petioles 3–12 cm. long; stipules lanceolate, entire; petals yellow and at times tinged with reddish-purple on outside, obovate, 8–12 mm. long, half as wide, slightly bearded; spur short; stigma bearded; sepals lanceolate or linear, acuminate, 5–10 mm. long; peduncle 3–8 cm. long; capsule subglobose, 7 mm. long, brown; seeds brown, 2.5–3.0 mm. long.

Manitoba and North Dakota to Missouri and Kansas, south in the Rocky Mountain states to New Mexico and Arizona. Colorado: prairies, plains, and foothills; open situations from 4,000 to 8,000 feet; common. April–June.

14. *VIOLA VALLICOLA* Nels., Bull. Torr. Bot. Club 26: 128. 1899. *V. physalodes* Greene, Pl. Baker. 3: 12. 1901.

Rootstock short, with fascicled fleshy roots, ascending; plant caulescent, low, 4–12 cm. tall, glabrous or pubescent; stems somewhat spreading; leaf-blades ovate to lanceolate, obtuse, base rounded, basal leaves often subcordate, 2–5 cm. long, 1.0–2.5 cm. broad, generally puberulent with ciliate margins, entire or obscurely denticulate; petioles as long as the blades or longer; stipules lanceolate; petals bright yellow streaked with purple, obovate or broadly spatulate, 8–12 mm. long, half as wide, beardless or slightly bearded; spur short; sepals linear-lanceolate, acuminate, 5–7 mm. long; peduncle shorter than leaves or surpassing them; capsule broadly ovoid, 5–7 mm. long; seeds 1.5–2.0 mm. long.

North Dakota, Saskatchewan, British Columbia, and Washington, south in the Rocky Mountain area to Colorado. Colorado: moist valleys, 5,000 to 8,000 feet; infrequent. May–June.

15. *VIOLA BELLIDIFOLIA* Greene, Pittonia 4: 292. 1901. *V. demissa* Greene, Pl. Baker. 3: 10. 1901. Subalpine Blue Violet.

Rootstock erect or ascending; plant glabrous, dwarf and tufted, 2–6 cm. tall, subcaulescent, the stems short and obscure; leaf-blades round-ovate, 5–16 mm. long, nearly as broad, obtuse at apex, obscurely cordate at base, entire or crenulate; petioles 1–4 cm. long; stipules linear-lanceolate, with a few bristly teeth;

petals violet-purple above, lighter below, obovate, 5–10 mm. long, 3–6 mm. wide; lateral petals slightly bearded; spur half as long as petals, often curved; sepals oblong-lanceolate, 3–5 mm. long, 0.5–1.0 mm. wide; peduncles numerous, 1.5–7.0 cm. long, generally surpassing the leaves, bracteolate above the middle; capsule subglobose, 5 mm. long; seeds 1.5 mm. long.

British Columbia, Montana and Idaho to Colorado; also in northern California. Colorado: mountain areas from 8,000 to 12,000 feet and higher, often in dense mixed herbaceous vegetation; rather frequent. June–August.

16. *VIOLA ADUNCA* J. E. Smith, in Rees, Cycl. 37: pl. 63. 1817. *V. subvestita* Greene, Erythea 5: 39. 1897. *V. montanensis* Rydb., Mem. N. Y. Bot. Gard. 1: 263. 1900. *V. odontophora* Rydb., Mem. N. Y. Bot. Gard. 1: 164. 1900. *V. inamoena* Greene, Pl. Baker. 3: 11. 1901. *V. retroscabra* Greene, Pittonia 4: 290. 1901. Hooked Violet.

Rootstock ascending; tap root long; plant caulescent, 4–25 cm. high, glabrous to glabrate or puberulent or scaberulous; stems numerous; leaf-blades round-ovate or subcordate-ovate, some often ovate-trigonous, 1–4 cm. long, often as broad or nearly as broad as long, crenulate, truncate or cuneate at base, upper leaf-blades narrower; petioles 1–6 cm. long; stipules linear-subulate or linear-lanceolate, nearly entire, toothed or spinulose-serrate; petals violet-purple, obovate or broadly spatulate, 7–12 mm. long, 4–6 mm. wide, lateral petals bearded; spur 4–7 mm. long, straight, curved, or hooked; sepals linear-lanceolate, 5–7 mm. long, 0.5–1.0 mm. wide; peduncles 2–8 cm. long, often surpassing the leaves, bracteolate above the middle; capsule ellipsoidal, 6–7 mm. long; seeds 1.5–2.0 mm. long.

New Brunswick, eastern Quebec, and Vermont to Alaska, British Columbia, and California, south in the Rocky Mountain area to Colorado, Utah, and New Mexico. Colorado: hills and valleys; shaded situations, 5,000 to 10,000 feet; frequent. May–July.

16a. *VIOLA ADUNCA* subsp. *ASHTONAE* M. S. Baker, Madroño 3: 233. 1936. This subspecies differs from the species in the glabrous herbage, the somewhat smaller and paler corollas, the oblong-ovate to oblong-lanceolate (not linear-lanceolate) sepals, the short spur and the emarginate capsule. Cub Lake Trail, Estes Park, Colorado.

16b. *VIOLA ADUNCA* subsp. *RADICOSA* M. S. Baker, Madroño 3: 234. 1936. This subspecies differs from the species in having dense short mostly retrorse pubescence throughout, the leaves often acuminate with the base tending to be truncate, and the capsule notched. Kawuneeche Valley, twelve miles north of Grand Lake, Colorado.

17. *VIOLA RUGULOSA* Greene, Pittonia 5: 26. 1902. *V. Rydbergii* Greene, Pittonia 5: 27. 1902. Rydberg Violet.

Rootstock ascending; plant caulescent, 1.5–4.0 dm. high, pubescent, stoloniferous; leaf-blades thickish, cordate-reniform, abruptly short-pointed, 1–7 cm. long, 2–10 cm. wide, serrate, hirsutulous especially beneath, upper leaves smaller and more often ovate-acuminate; petioles of root-leaves 3–20 cm. long, upper leaves with short petioles, 1–12 mm. long; stipules entire or nearly so, lanceolate, obliquely acuminate, not wholly scarious; petals violet or nearly white, purple veined, broadly spatulate or obovate, 6–12 mm. long, half as wide, lateral petals bearded; spur short; sepals subulate pointed, 3–7 mm. long, 1 mm. or less wide, minutely pubescent, margins white; peduncle 1.5–5.0 cm. long; cleistogamous flowers often appearing later; capsule ovoid to subglobose, minutely pubescent or nearly glabrous, 6–10 mm. long, greenish-brown; seeds brown, 1.5–2.0 mm. long.

Manitoba, Minnesota and Iowa, west to British Columbia, also in the Rocky Mountain area through Idaho, Montana, Wyoming, and Colorado to Arizona. Colorado: woods and shady stream-sides from 5,000 to 9,000 feet; locally common. May, July or October.

This species is distinguished from the similar *V. canadensis* by the presence of stolons and the broader leaf-blades.

18. *VIOLA CANADENSIS* L., Sp. Pl. 936. 1753. *V. neomexicana* Greene, Pittonia 5: 28. 1902. Canada Violet.

Rootstock ascending; plant caulescent, 1.5–3.5 dm. high, nearly glabrous; leaf-blades thin, cordate-ovate, acuminate or acute, 1.5–6.0 cm. long, 1.5–5.0 cm. wide, serrate, teeth incurved, veins of under surface sometimes pubescent, smaller upper leaves often muriculate to hirtellous; petioles usually longer than blades, those of lower leaves often twice as long; stipules entire, lanceolate, obliquely acuminate, not wholly scarious; petals violet or nearly white, purple veined, broadly spatulate or obovate, 6–14 mm. long, 3–8 mm. wide, lateral petals bearded; spur short; sepals subulate pointed, 4–7 mm. long, 0.5–1.0 mm. wide, minutely pubescent, margins white; peduncles 1–8 cm. long; capsules ovoid or subglobose, mostly glabrous, 4–6 mm. long, brown; seeds brown, about 2 mm. long.

New Brunswick to South Carolina and Alabama, west and northwest through Ohio, Wisconsin, and South Dakota to northern Washington and Saskatchewan, south in the Rocky Mountain states through Colorado and Utah to New Mexico and Arizona. Colorado: moist woods and mountain slopes from 5,000 to 10,000 feet; frequent to common. April–June.

18a. *VIOLA CANADENSIS* L. var. *SCOPULORUM* Gray, Bot. Gaz. 11: 291. 1886. *V. scopulorum* (Gray) Greene, Pittonia 5: 27. 1902. A tufted and somewhat depressed form with small leaves and elongated peduncles, known only from Colorado.

University of Colorado,
Boulder, January, 1938.